U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE
SUBCOMMITTEE ON ENVIRONMENT, TECHNOLOGY, AND STANDARDS

**HEARING CHARTER**

Undersea Research and Ocean Exploration: H.R. 3835, the National Ocean Exploration Program Act of 2005 and the Undersea Research Program Act of 2005
July 27, 2006
2:00 p.m. to 4:00 p.m.
2318 Rayburn House Office Building

**Purpose:**

On July 27, 2006 at 2:00 p.m., the Subcommittee on Environment, Technology, and Standards of the House Committee on Science will hold a hearing to examine the National Oceanic and Atmospheric Administration's (NOAA) National Undersea Research Program (NURP) and Ocean Exploration (OE) Program and to receive comments on H.R. 3835, the National Ocean Exploration Program Act of 2005 and the Undersea Research Program Act. On July 1, 2005 the Senate passed S. 39, a bill largely identical to H.R. 3835 that would also authorize these programs. The Committee will examine the current programs, including their relationship to one another, in the context of pending legislation.

The Committee plans to explore these overarching questions:

1. What are the goals and missions of the Undersea Research and Ocean Exploration programs? How do these goals and missions relate to and complement other U.S. marine research programs?

2. Would a merger or consolidation of the NURP and OE programs still support the programs' activities and maintain the programs' role in national marine research?

3. Does H.R. 3835 provide sufficient guidance for the scope and direction of these programs and, if appropriate, for a merger?

**Witnesses:**

Panel 1
**The Honorable Jim Saxton**

**The Honorable Robert Simmons**

Panel 2
**Dr. Richard Spinrad** Assistant Administrator of the National Oceanic and Atmospheric Administration (NOAA) Office of Oceanic and Atmospheric Research (OAR).

**Mr. Andrew Shepard**, Director, National Undersea Research Center, University of North Carolina-Wilmington.

**Dr. Marcia McNutt,** President and CEO, Monterey Bay Aquarium Research Institute.

## Background on H.R. 3835:

H.R. 3835 was introduced by Mr. Saxton on September 20, 2005. The bill would authorize, for the first time in legislation, two existing programs within NOAA, the National Ocean Exploration Program (OE), which is the subject of Title I of the bill, and the NOAA Undersea Research Program (NURP), which is the subject of Title II (see Appendix II for a section-by-section summary of the bill).

The House Resources Subcommittee on Fisheries and Oceans held a hearing on H.R. 3835 on May 4, 2006. On July 1, 2006, the Senate companion to H.R. 3835, S.39 (sponsored by Senator Stevens), passed the Senate by unanimous consent, and was referred to the Committee on Science, and in addition to the Committee on Resources.

## Background on NURP and OE:

NURP, which had its origins in the 1970s, funds applied research in areas such as ecology and fisheries management that can be of use to policymakers, and generally focuses on areas that are relatively close to shore. NURP also funds the development of technology for undersea research, and education and outreach programs (such as the Aquarius underwater habitat, and JASON, which lets schools participate in undersea research).

NURP, housed in NOAA's Office of Oceanic and Atmospheric Research (OAR), operates through six regional centers at University of Connecticut (covering the North Atlantic and Great Lakes); Rutgers University (covering the Mid-Atlantic); University of North Carolina at Wilmington (covering the Southeastern United States and Gulf of Mexico); Perry Institute of Marine Science (covering the Caribbean)[*]; University of Hawaii (covering Hawaii and the Western Pacific); and University of Alaska at Fairbanks (covering the West Coast and Polar Regions). In addition to those six centers, the National Institute for Undersea Science and Technology (NIUST), established in 2002 by Congress, is based at the University of Mississippi and the University of Southern Mississippi. Each center manages its own operations and grant program, but research priorities and strategic direction are coordinated through the National Program Office at NOAA Headquarters.

The six centers use about 74 percent of their funding for competitively awarded research grants for scientists studying in their region. NURP support often includes the provision to scientists of equipment developed and owned by the centers, as well as technical support.

The OE program, also located in OAR, provides grants to researchers for expeditions to discover and document unknown or little know features of the oceans and Great Lakes. The program is run by NOAA Headquarters and focuses on a smaller pool of

[*] The Caribbean center will merge with the Gulf of Mexico and Southeast Atlantic center later this year.

scientists who attempt to discover and record new and novel physical, biological or chemical aspects of the deep ocean far from the continental shelf, often deeper than 10,000 feet. The program supports development of new technologies and works with academic and industry partners to adapt commercial and experimental technologies to deep-water exploration activities. Education and outreach is a high priority, and OE uses its high-profile expeditions to engage students and the general public in the exploratory process and raise awareness of marine issues and their impacts on people's daily lives.

OE and NURP complement Office of Naval Research (ONR) and National Science Foundation (NSF) support for basic oceanographic research. OE expands the boundaries of the "known" marine environment, which can open up new lines of scientific inquiry, while NURP supports applied marine research that bridges the gap between basic marine science (funded by ONR and NSF) and the applied science and information needs of marine policy makers and resource managers.

**Issues with NURP and OE:**

Congressional Support for NURP

NURP has always received substantial Congressional direction in terms of the location of the regional centers and the allocation of funding for each center. Some of the regional NURP centers were established by Congressional direction rather than by a competitive process. This led to a perception among many academic scientists that some NURP centers operate within closed communities whose resources were not allocated in a transparent, competitive and rigorous way, and whose activities have been unresponsive to NOAA's science needs and strategic goals.

In the last decade, NOAA has attempted to bring NURP activities more in line with NOAA priorities and has formalized a centrally-coordinated and transparent grant program. While research grants are still awarded through the individual centers, there is now a uniform peer review process that is patterned after NSF's peer review process and coordinated with NOAA research priorities.

However, a new issue arose in the FY 2006 appropriations process. NURP funding was cut from approximately $17 million to $9 million and all NURP center funding was directed to the two centers on the West Coast. NOAA reprogrammed funding to maintain minimal services at the East Coast centers but it is unclear how the centers will fare in FY 2007.

Measuring Program Success

Some scientists remain concerned about the clarity of NURP's and OE's missions and the metrics used to measure the programs' success. NURP's mission is largely to enable and support marine research by developing and supporting technology and technical knowledge. Many of the benefits that NURP provides to the marine research community (accrued expertise and regional knowledge, for example) can be difficult to define or quantify. OE's mission is to observe and survey little-known regions of the ocean. However, some scientists have criticized the OE program for not providing support or guidance for research beyond the initial observation of unexplored areas.

Merger of NURP and OE

In response to appropriations report language in 2004, which directed NOAA to consider realigning programs in OAR, NOAA has begun the process of merging NURP and the OE program, although it has not yet provided any details on how it will accomplish this. However, the current organization of the two programs is quite different. OE is a highly centralized program, run out of NOAA Headquarters, that manages and enables large-scale, deep water exploration of oceans around the world. In contrast, NURP is a regionally organized program that supports detailed study of marine resources and habitats within 200 miles of U.S. coasts and focuses its scientific support on operational and strategic priorities in line with NOAA's stewardship missions.

Scientists have expressed concern that the structures of the two programs are divergent and that a merger may result in the loss of significant and important benefits of one or both programs. Experts who are concerned with the vitality of the nation's ocean exploration programs express concern that OE funding would be directed to operational and mission-oriented efforts rather than the deep water discovery that they see as the most critical. Marine researchers and managers who interact with the NURP program are concerned that if the merged program became more centralized the emphasis on regionally-important research would decrease. Proponents of both programs are concerned that combining the programs will result in a net decrease in funding for both efforts and an associated decline in the quality and quantity of marine research.

Administration of the Ocean Exploration Program

In 2003, the National Research Council of the National Academies released a study of ocean exploration programs that called for a dedicated national ocean exploration program. The report suggested the National Oceanographic Partnership Program (NOPP) would be the most appropriate place to form the program, rather than NOAA. (NOPP is a collaboration of 15 federal agencies that is supposed to coordinate all national ocean research.) Concerns over placing the program in NOAA stemmed from recurring problems in existing programs such as "slow grant processing and a lack of responsiveness to researchers" and NOAA's focus on internal NOAA agency topics that do not explicitly include exploration of the marine environment.

In contrast, in September 2004, the U.S. Commission on Ocean Policy, established by the Oceans Act of 2000, submitted a report entitled "An Ocean Blueprint for the 21st Century," in which the Commission recommended that NOAA and NSF lead an expanded national ocean exploration program with collaboration from the U.S. Geological Survey and the U.S. Navy's Office of Naval Research.

**Funding History of NURP and OE:**

From its inception in 1981 until the mid-1990s appropriations for NURP grew to approximately $20 million annually, then dropped to below $15 million. Between1996 and 2005, NURP appropriations remained between $13 million and $18 million. Of that amount, approximately 70-75 percent was directed to NURP centers; each East Coast

center received approximately $1 - $1.5 million and each of the two West Coast centers received approximately $2.5 million. As depicted in the table below, in FY2006, NURP funding was cut from approximately $17 million to $9 million and all NURP center funding was directed to the two centers on the West Coast.

The Office of Ocean Exploration was organized in 2001 with an appropriation of $4 million. The OE appropriation for 2002 was $14 million, and for 2003 was $15.1 million. FY2006 funding for OE dropped from $29 million to $14 million.

| | FY 2004 Enacted | FY 2005 Enacted | FY 2006 Req. | FY 2006 Enacted | FY 2007 Req. | FY 2007 House passed | FY2007 Senate mark | HR3835 FY2007 authori-zation |
|---|---|---|---|---|---|---|---|---|
| **Ocean Exploration Program** | $29.68 | $28.60 | $22.70 | $14.10 | $15.10 | | $27.0 | $33.55 |
| **National Undersea Research Program** | $16.80 | $17.20 | $10.50 | $9.10 | $9.20 | | $18.0 | $19.25 |
| **TOTAL for NURP and OE** | $46.48 | $45.8 | $33.2 | $23.2 | $24.3 | $16.00 | $45.0 | $52.75 |

## Background on Undersea Research and Ocean Exploration:

### The Need for Ocean Exploration and Undersea Research

More than 70 percent of the Earth's surface is covered by oceans. The oceans and Great Lakes are a source of valuable living and non-living resources, provide enormous benefit to the transportation and recreation industries, impact development and human health around the country, contain vast quantities of mineral and fossil fuel deposits, and play a key role in Earth's climate system. The oceans also influence the economy. NOAA estimates that in 2003 commercial and recreational fishing contributed $43.5 billion to the national GDP. In addition, over 90 percent of the U.S. population is served by shipping on the oceans and Great Lakes.

Despite the present and future benefits that the oceans and Great Lakes provide, the world's oceans remain virtually unexplored and un-described. A few examples illustrate this:

- NOAA estimates that over 99 percent of the oceans' floors have yet to be explored, and maps of Earth's ocean bottoms have a resolution of 7 miles. By comparison the Mars Global Surveyor has photographed the surface of Mars with a resolution as high as 1.6 *feet.*
- Pulley Ridge, a 60-mile-long reef off the coast of Florida, hosts a diverse and thriving ecosystem in water that is shallow enough to dive in, but was unknown until less than a decade ago.
- Discovered only within the last decade, deep-sea corals appear to offer critical habitat to many marine species including commercially important fish species.

Our incomplete understanding of the marine environment raises concern among many researchers and policy makers that resource management and research priorities cannot be set to make the best possible use of research dollars and to most effectively

support policy decisions. For example, because they were unknown, deep-sea corals were not being included in research, conservation and management efforts until very recently.

The Federal Role in Undersea Research and Ocean Exploration

One of NOAA's missions is to understand and predict changes in the oceans and Great Lakes to enable effective conservation and management of the nation's marine resources. Developing the information and knowledge base to meet this mission requires thorough study of marine environments. However, the study of underwater environments is not as simple as equivalent studies on land. Aquatic environments pose significant technical challenges to the use of observing and recording technologies that land-based scientists take for granted, such as satellite observations, aerial photography, GPS, and simple human observation. To be able to spend time beneath the surface of lakes and oceans to perform marine research, humans require sophisticated technology such as SCUBA, submersibles, remotely operated and autonomous underwater vehicles, and *in situ* observation systems. Each of these technologies has taken years to develop and, in some cases, years to adapt to research use. These technologies are costly and require significant technical expertise to reduce the risk to researchers and equipment to acceptable levels. Few researchers have the time and resources to devote to acquiring and mastering these technologies and many marine science programs cannot afford the infrastructure and support staff needed to sustain such programs. By providing long-term funding and strategic direction for marine science, NURP and OE have become repositories of the equipment and expertise that scientists need to pursue underwater exploration and research. See Appendix II for a more detailed history of the two programs.

**Witness Questions:**

The witnesses were asked to address the following questions in their testimony:

1. What are the strengths and weaknesses of H.R. 3835? In particular:
    - Does the bill capitalize on the strengths of the programs, and effectively address their weaknesses? If not, what changes to the bill would you recommend?
    - Does the bill provide appropriate guidance for the scope and direction of these programs? If not, should the bill language be more or less prescriptive, and how?
    - What specific changes to the bill do you recommend to strengthen the legislation?

2. What are the strengths and weaknesses of the current National Undersea Research and Ocean Exploration Programs? What steps need to be taken to ensure the rigor of these programs and to encourage appropriate follow-on projects to meet their missions? Do you believe that these programs would be strengthened by a merger? If so, what form should a merger take? If not, why not?

# Appendix I

**Section by Section Summary of H.R 3835**

Title I – National Ocean Exploration Program
Sec. 101 – Short Title
Specifies that this title may be referred to as the "National Ocean Exploration Program Act."

Sec. 102 – Establishment
Directs that the Secretary of Commerce, through the Administrator of the National Oceanic and Atmospheric Administration (NOAA), shall, in consultation with the National Science Foundation and other appropriate Federal agencies, establish a coordinated national ocean exploration program within NOAA that promotes collaboration with existing programs, including NURP.

Sec. 103 – Authorities
The Administrator of NOAA shall: conduct interdisciplinary exploration voyages or other scientific activities in conjunction with other Federal agencies or academic institutions to survey little known areas of the marine environment, inventory, observe and assess living and nonliving marine resources, and report such findings; give priority attention to deep ocean regions, with a focus on surveying deep water systems that hold potential for important scientific discoveries; conduct scientific voyages to locate, define, and document historic archeological sites; in consultation with the National Science Foundation, develop a transparent process for peer review of proposals; enhance the technical capabilities of the United States marine science community; accept donations of property, data, and equipment for exploring the oceans or increasing knowledge of the oceans; and establish an ocean exploration forum to encourage partnerships and promote communications.

Sec. 104 – Ocean Exploration Technology and Infrastructure Task Force
In coordination with the National Aeronautics and Space Administration, the U.S. Geological Survey, Office of Naval Research, and relevant governmental, non-governmental, academic and other experts, NOAA shall convene an ocean exploration technology and infrastructure task force to develop and implement a strategy to: facilitate the transfer of new technology to the ocean exploration program; improve the availability of communications infrastructure to the program; develop an integrated, workable, and comprehensive data management information processing system that will make information on unique and significant features obtained by the program available for research and management purposes; conduct public outreach in conjunction with relevant programs of NOAA, NSF and other agencies; and encourage cost-sharing partnerships that will assist in transferring exploration technology and expertise to the program.

Sec. 105 – Interagency Financing
NOAA, NSF, and other involved federal agencies are authorized to participate in interagency financing.

Sec. 106 – Application with Outer Continental Shelf Lands Act
Specifies that nothing in this title or in Title II shall supersede, or limit the authority of the Secretary of the Interior under, the Outer Continental Shelf Lands Act (43 U.S.C. 1331 et seq.).

Sec. 107 – Authorization of Appropriations
Authorizes appropriations to NOAA to carry out this title. Authorization levels begin at $30.5 million for FY2006 and increase by approximately 10 percent each year to $71.92 million for FY2015.

Title II – Undersea Research Program
Sec. 201 – Short Title
Specifies that this title may be referred to as the "NOAA Undersea Research Program Act of 2005."

Sec. 202 – Establishment
Specifies that the Administrator of NOAA shall establish and maintain an undersea research program and shall designate a Director of that program.

Sec. 203 – Purpose
Specifies that the purpose of the program is to increase scientific knowledge essential for the informed management, use and preservation of oceanic, coastal, and large lake resources through undersea research, exploration, education, and technology development. Also specifies that the program shall be part of NOAA's undersea research, education and technology development efforts and shall make available the infrastructure and expertise to service the undersea science needs of the academic community.

Sec. 204 – Program
Specifies that the program shall be conducted through a national headquarters, a network of regional undersea research centers, and a national technology institute. The Director shall provide overall direction with advice from a Council comprised of the directors of the regional centers and the national technology institute.

Sec. 205 – Regional Centers and Technology Institute
Specifies that the regional centers and national technology institute shall provide: core research and exploration based on national and regional priorities; further advance undersea technology development to support NOAA's research mission and programs, including technology associated with seafloor observatories such as LEO-15 and the Aquarius habitat, remotely operated vehicles, autonomous underwater vehicles, and new sampling and sensing technologies; undersea science-based education and outreach programs to enrich ocean science education and public awareness of the oceans and Great Lakes; programs for the discovery, study, and development of natural products from ocean and aquatic systems.

Sec. 206 Competitiveness

Specifies that no more than 10 percent of the program budget may be set aside for discretionary spending on rapid response activities and NOAA-related service projects. Further specifies that all other external projects supported by the regional centers shall be managed using an open and competitive process to evaluate scientific merit, relevance to NOAA, regional and national research goals, and technical feasibility.

Sec. 207 – Authorization of Appropriations

Authorizes appropriations to NOAA to carry out this title. Authorization levels begin at $12.5 million for the regional centers and $5 million for the national technology institute for FY2006, and increase by approximately 10 percent each year to $29.47 million for the regional centers and $11.79 percent for the national technology institute in FY2015. Stipulates in each fiscal year that 50 percent of the funds for the regional centers shall be for West Coast Regional Centers and 50 percent shall be for East Coast Regional Centers.

## Appendix II

NURP and OE Program History

NOAA has been a center of technical marine expertise since it was established by executive order in 1970. The Manned Undersea Science and Technology (MUST) office, established in the early 1970s, supported NOAA SCUBA dive and undersea habitat operations around the world. The National Research Council examined the MUST program and related efforts in a 1980 report entitled, "The OceanLab Concept" which proposed a reorganization of MUST into a NOAA Dive Program and a regional undersea research and technology program designed to better integrate NOAA with academic and industry dive communities. The report supported the formation of a National Underwater Laboratory System which culminated in the formation of the National Undersea Research Program in 1981. During most of the following 15 years, NURP was a Congressionally-directed program for which the Administration did not request funding. Starting in 1995, NURP became a line item in NOAA's budget request. In 1997, NURP underwent "Reinvention" in which the program was realigned to match NOAA's strategic mission more closely, and a three to five year review process was implemented to periodically review each of the NURP centers.

By the late 1990s, NOAA exploration efforts were not an organized part of the agency's activities. In June 2000, the President commissioned the Secretary of Commerce to hold a panel on the state of ocean exploration. The final report was presented to the President in October of 2000 and outlined the need for a national ocean exploration program focused on the goal of discovery. The panel recommended the undertaking of multidisciplinary expeditions to include physical, geological, biological, chemical and archaeological oceanographic exploration and mapping, exploration of ocean dynamics and interactions, the development of new sensors and technologies to ensure that the United States remain at the forefront of ocean exploration, and an extensive campaign to utilize new methods to improve ocean literacy and information dissemination to research communities and the public. The report emphasized the need to revitalize a purely oceanic exploratory program to expand our general knowledge of the extent and content of marine environments around the world.

In response, NOAA established the Office of Ocean Exploration within OAR in 2001. OE was directed to study new ocean resources, research ocean acoustics, document American maritime heritage, explore ocean frontiers, and conduct a census of ocean life. In collaboration with other NOAA programs, academic institutions, and several nongovernmental organizations, this Program has completed over 100 expeditions and has explored a wide variety of uniqe ecosystems from the deep waters in the Gulf of Mexico to Alaska's continental shelf, where more than 4,000 shipwrecks line the ocean bottom.